Dist.
GENERAL
UNCTAD/SDD/INS/9
28 August 1995
Original: ENGLISH
ENGLISH and FRENCH only

UNITED NATIONS CONFERENCE ON TRADE AND DEVELOPMENT

Financial implications of agricultural insurance

A background note prepared by the UNCTAD secretariat

CONTENTS

		Paragraphs
	PREFACE	1 - 3
	SUMMARY	4 - 7
Chapter		
I.	INTRODUCTION AND BACKGROUND	8 - 13
II.	COMMERCIAL EXPECTATIONS FOR 1995	14 - 18
III.	INSURING AGRICULTURAL RISKS	19 - 25
IV.	FINANCIAL IMPLICATIONS: PROBLEMS AND PRACTICE	26 - 45
	A. Is agricultural insurance large enough to be commercially viable on its own?	26 - 31
	B. Premium rate compatibility: loss variance, government assistance, reinsurance and direct capacity	32 - 40
	C. The insurer's predicament: maintaining a balance between losses and management expenses	41 - 45
V.	CONCLUSIONS	46 - 50
	FIGURES	
	NOTES	

GE.95-52919

PREFACE

1. The Standing Committee on Developing Services Sectors: Fostering Competitive Services Sectors in Developing Countries - Insurance, at its second session, held from 4 to 8 July 1994, recommended that a background note be prepared examining the experiences and initiatives of developing countries in agricultural insurance ***"... with particular emphasis on the financial implications of agricultural insurance;"***.[1]

2. This recommendation followed the session's discussion on agenda item 5(c), for which the secretariat had prepared a sessional document as well as a more extensive background document.[2] Most delegations, in their opening and closing statements, expressed the conviction that agricultural insurance is an important service for farmers, insurers and the national economy. However, in the informal session, some expressed reservations about the financial and commercial viability of certain types of agricultural covers, in particular crop insurance. Many delegations agreed that the Standing Committee can conditionally recommend the establishment or expansion of agricultural insurance, keeping in mind the economic and financial implications of a failing insurance scheme and the role of Governments as "insurers of last resort". The Standing Committee therefore asked the secretariat to prepare a background note studying the financial implications of agricultural insurance. The present note attempts to address this issue. It is complementary to and should be read in conjunction with previous UNCTAD documents on the subject.[3]

3. The data presented in this note was compiled through three surveys conducted by the UNCTAD Insurance Programme. Two were directed to insurance supervisors in developing countries and were realised in 1991 and 1994/1995. The surveys were practically identical in structure and achieved a cumulative response from 44 countries. The third survey asked insurers in developing countries to express their market expectations for 1995 and 1997 and included questions on agricultural insurance. The survey generated responses from 34 major insurers from 28 developing countries.[4]

SUMMARY

4. It has been suggested that agricultural insurance may be a growth market for developing country insurers, particularly when faced with liberalization and foreign competition in the established local insurance markets. However, insurability problems of a diverse nature are sometimes encountered in this class of business.

5. Against a background of generally positive expectations of commercial results in this sector, the present note examines the insurability requirements of risks and their relationship to perils encountered in agricultural insurance. Commercial expectations for 1995 may be summarised as follows: stagnant premium volume and consumer demand growth, break-even or positive underwriting results expected by 62.5 per cent of surveyed insurers and no change in insurance rates or conditions.

6. Analysing real-world data against a background of risk insurability assessment brings to light several financial implications which insurers embarking on or expanding operations in this class should treat with particular attention and caution. First, the low value of agricultural risks may increase premium rates to the point where covers may not be affordable for farmers, resulting in an increase in risk selection problems. Secondly, the high loss variance and propensity towards catastrophic loss results of particular perils affecting agricultural risks may also make rates unaffordable. Thirdly, the level of premium rates has an important inverse effect on farmer participation and the potential integration of disaster relief programmes with commercial schemes. Fourthly, the loss volatility of some agricultural risks may increase the direct insurer's dependence on reinsurance. International reinsurance market rates are formed on the basis of commercial considerations and, therefore, cooperation between developing country insurers and their Governments may be necessary in order to match direct and reinsurance rates. Lastly, the often perceived inverse relationship between losses and management/administrative expenses does not exist in practice. Incurring greater management expenses for more detailed risk and claims assessment may not improve the average loss profile (i.e. may not decrease loss ratios) of agricultural insurance lines. On the contrary, there may be a direct relationship: *increased management expenses* increase rates, which decrease sales, which increase adverse selection problems, which, in turn, *increase loss ratios*.

7. In conclusion, providing insurance tailored for the rural market and covering perils that do not have problems with risk independence, exposure or tariffs may be worth considering. However, crop insurance, in particular the provision of multi-peril crop covers, up to the time of the UNCTAD survey in 1995[6], in general is not perceived as a growth market for developing country insurers. Nevertheless, insurers could endeavour to run such schemes if they secured the close cooperation of their Governments and authorities concerned with the agricultural economic sector or other assistance to provide financial means to establish reinsurance capacity or to provide subsidies for the purchase of reinsurance in the international market if a loss gap exists between direct and reinsurance rates.

Chapter I
INTRODUCTION AND BACKGROUND

8. In most developing countries, agriculture still represents a significant component of the economy and provides an important part of the national income. Subject to the unforeseeable perils of nature and hazards often beyond the control of agricultural producers, yields vary significantly more than in the extractive or manufacturing industries. The resulting income irregularities reduce possibilities for external financing and the application of modern agricultural technology and thereby diminish the commercial growth potential of particular producers and the economic and social security and stability of the agricultural sector in general.

9. The provision of insurance for agricultural risks and its income stabilization effect can contribute to increasing the efficiency and productivity of the agricultural sector and improve the social and economic well-being of all people living in rural areas. At the same time, insurers may benefit from developing a yet undeveloped insurance market. It has been suggested that agricultural insurance may be a growth market for developing country insurers, particularly when faced with liberalization and foreign competition in the established local insurance markets.

10. Insurance services are not provided to the agricultural sector to the same extent as to other extractive or manufacturing industries for two basic reasons. First, values of agricultural risks are smaller than in other industries and therefore do not generate commercially significant premium volumes. This increases the relative size of fixed costs to variable costs involved in writing agricultural covers, and these unavoidably high overhead costs tend to make agricultural insurance less profitable. Secondly, insurers may have to retain much of the risk, as there is no regular reinsurance market for agricultural risks from developing countries. Underwriting these risks requires astute technical knowledge and an accumulation of experience and information by the direct insurer.

11. A previous UNCTAD study, "Agricultural insurance in developing countries" (UNCTAD/SDD/INS/1/Rev.1), has dealt in detail with the underwriting considerations for crop, livestock, poultry and aquaculture risk and has discussed the potential rural insurance market, as well as the international reinsurance market, for agricultural risks. It concludes:

> *"... the difficulties to be overcome in introducing and propagating agricultural insurance in developing countries should not be underestimated. They are many and formidable. In a number of countries only a few lines have been introduced, and in others, while schemes have been devised, their scope is limited. A more purposeful thrust will require conscious and concerted efforts and the process should be initiated sooner rather than later."* [8]

The study, comprehensive in nature, gives extensive definitions and commentaries on the risks, perils, hazards and insurable interests encountered in agricultural

insurance. These will not be repeated here, and the reader is invited to refer to the mentioned study, as well as to other UNCTAD documents dealing with insurance.[9]

12. The present note will discuss issues related to the first of the two reasons why insurance is not widespread in the agricultural sector, namely the commercial and financial aspects of introducing or increasing agricultural insurance operations. The problem of the necessity of considerable technical knowledge and information to underwrite agricultural risks, however related to the commercial performance of a particular cover, is indisputable and can be dealt with through technical cooperation and training.

13. Finally, the reader should keep in mind several points when considering this note. First, the empirical data presented, while descriptive and focused, is only a small sample of real-world experience. Globally, the practice of agricultural insurance has brought varied results. Secondly, this note does not discuss whether agricultural insurance generally produces profits or losses. Rather it discusses the insurability criteria of agricultural risks and the resulting financial implications for insurers. It attempts to convey the necessity of a thorough insurability assessment if an insurer wishes to enter or increase business for a particular risk.

Chapter II
COMMERCIAL EXPECTATIONS FOR 1995

14. In December 1994 the UNCTAD secretariat conducted a survey among 34 insurance and reinsurance companies in 28 developing countries[10] asking them to present their expectations for 1995 on a number of issues, among which premium volumes, consumer demand, underwriting results and rates and conditions in the agricultural insurance sector. The general understanding was that agricultural insurance includes all types of policies sold in rural areas, including, but not only, crop and livestock insurance, as well as more common covers such as fire, machinery breakdown and accident insurance. The results are presented in figures 1, 2 and 3.

15. Figure 1 describes commercial expectations for the near future. More than 40 per cent of the replies were of the view that agricultural insurance premium volume and consumer demand would match or outperform GDP growth. However, the median reply was that this sector would stagnate in 1995. The decreasing relative importance of the agricultural economy may explain, in part, this response. Another explanation may be that, with the industrialization of food production and with the increasing complexity of risks, covers provided to agricultural producers may not necessarily fall into the category of agricultural insurance any more. As concerns commercial expectations, the following two figures may further clarify the situation.

16. Figure 2 shows that more than 60 per cent of the replies were of the view that underwriting results for agricultural insurance in 1995 would produce a break even or positive financial situation. However, an important 37.5 per cent

of respondents believe that writing agricultural risks in 1995 will produce small or heavy losses.

17. Figure 3 shows that the overwhelming majority of respondents believe that there will be no change in rates and conditions in 1995. This moderate pessimism over future results, coupled with low expectations of hardening of rates and conditions, is probably the main cause for expectations of stagnant growth in this sector.

18. Against this background of commercial expectations and based on examples and information from insurance practice and principles, this note will attempt to provide insight as to which could be the components of agricultural insurance that have a particular effect on its profitability and therefore present important financial implications for insurers and Governments.

Chapter III
INSURING AGRICULTURAL RISKS

19. In the continuation of the discussion, a more narrow definition of agricultural insurance will be used: it will relate to insurance covers specifically addressing crop and livestock risks. Underwriting these risks is complex because of the particular causes and conditions of loss they are subject to. They may be considered as a distinct class of risks because they are the focus of the rural economy and many Governments allocate significant budgetary means to indemnify, at least in part, farmers for particularly severe losses caused by natural perils. Many Governments would wish to see agricultural producers buying insurance on a commercial basis, thereby reducing this budget burden.

20. Before an insurer decides to devote capital to writing agricultural insurance he must carefully examine the risk(s) in question and make an ***accurate assessment of their insurability***. The six basic requirements of an insurable risk are:[11]

1. The premium charged must be economically feasible for all parties;
2. There should be a large number of homogenous objects exposed to the same peril;
3. The probability of the occurrence of the peril insured against must be calculable;
4. The loss should not be catastrophic;
5. The loss must be sufficiently large, determinable and measurable;
6. The loss must be accidental and unintentional.

21. Requirement 1 synthesizes the ideas behind requirements 2 through 6. Further, it compels insurers to analyse and decide wether there is a market for their cover at the proposed price and conditions. This process usually involves several issues which need to be carefully examined. First, do farmers have the necessary purchasing power and cash flow to buy the cover? As agriculture can often be a cyclical business, many farmers experience significant debt-to-income ratios and perpetual cash-flow problems. Providing agricultural insurance covers

may therefore lead to premium collection difficulties. A recent UNCTAD survey of insurers in developing countries has shown that premium collection problems are expected to be the fourth most noted cause of financial difficulties in 1995. Second, will the set premium rates provide enough premium income to pay claims, maintain and increase reserves and cover costs of agents' commissions, as well as the fixed costs of administering and managing the provided covers (i.e. will a sufficient economy of scale be achieved)? However simple, this point is worth considering very seriously, in particular as the above-mentioned UNCTAD survey showed that insufficient premium rates are expected to be the foremost cause of financial difficulties in 1995. For reasons to be discussed later in this note, insurers often find combined results in their agricultural insurance portfolio presenting substantial losses in spite of loss ratios being well below 100 per cent. Lastly, if we assume that the insurer will reinsure even a small portion of the risk, are the direct premium rates, at which a farmer is willing and financially able to buy cover, compatible with available reinsurance rates? The retention of a large proportion of the risk is, in most cases, not a financially sound policy. This is certainly true for agricultural insurance, as it deals in part with natural perils, of which some are particularly destructive and may cause catastrophic losses that can present serious exposure problems for an insurer without sufficient reinsurance. Further, agricultural risks, in particular crop risks, are often not independent at the provincial or country level, and attritional losses may lead to claims of a catastrophic level.[12] Excess precipitation may lead to floods which may lead to landslides and subsidence: while the immediate claims do not have to be of catastrophic proportion, the occurrence of a particular peril may trigger losses which in accumulation can become disastrous. This only strengthens the need for more reinsurance.

22. Requirement 2, that there should be a large number of homogeneous exposure units, assumes that the underwriting risk faced by the insurer is inversely related to the loss variance of the insurance portfolio for the particular line. With an increase in the number of exposure units, the underwriting risk per insured unit decreases and the total underwriting risk for the insurer increases but at a decreasing rate. This assumption is valid only if the individual loss events are truly independent. A lack of independence implies the existence of potential for catastrophic losses, a problem brought forward by requirement 4. If independence does not exist, there is no point in increasing exposure by insuring more units, as this does not decrease the total loss variance (i.e. risk) of the portfolio relative to individual units. Figure 4 describes graphically two possible outcomes of commercial expansion in a line of agricultural insurance. Starting from a small portfolio with a defined average loss distribution curve ***A***, if loss events are independent the insurer can insure more farms and move to curve ***B*** and simultaneously decrease his portfolio risk and, provided he is willing to invest additional capital to enlarge his underwriting capacity, increase premium volume. However, if loss events are not independent, the insurer will move to curve ***C*** when increasing the number of farms (exposure units) insured and will increase his portfolio risk even if he maintains the same nett premium volume by ceding more risk and premium. The commercial implications of this deliberation are quite clear: if loss events are independent, insurers may increase premium volumes with a less than proportional

increase in capital and reserves, provided the particular line is already showing a combined result below 100 per cent. If loss events are not independent, the insurer should not write more business and should attempt to reduce retention in the existing portfolio by reinsuring or eventually writing less business. Requirement 3 underlies requirement 2 in that any assessment of underwriting risk is impossible without first determining the expected frequency of the peril insured against.

23. Requirement 4, that losses should not be catastrophic, is central to agricultural insurance. Both exposure units (farms in agricultural regions and areas) and perils insured against (fire, flood, insect infestation, plant disease, windstorms, etc.) are located in and affect defined geographic areas. However, certain natural perils can cause severe losses over very large territories (draught, frost and freezing). When hit by such a natural peril, farming regions record claims in large numbers. As discussed previously, a portfolio with a large number of farms (i.e. a good spread of exposure) is of little use if the peril can cause region- or country-wide catastrophic losses. There are several ways to deal with the problem of catastrophic loss, among which:

- Physical measures (prevention and loss minimization); and
- Financial measures, such as:
  - Establishing a catastrophe insurance pool, mutual or government insurance fund; and
  - Allowing tax-free reserving for catastrophic losses over an extended period of time.

The UNCTAD secretariat has recently produced a study dealing explicitly with the problems of catastrophe insurance in developing countries.[11]

24. Requirements 5 and 6 are elementary to the provision of an insurance cover. Losses that evade quantification because of their size or lack of definition generally cannot be the mainstay business of an insurer. This is particularly true for agricultural insurance where, risks are small in value and claims assessment requires a high level of technical and insurance knowledge. Many insurers hesitate in writing agricultural risks because the risks fail this insurability criteria:

> *"... The loss to be insured against should be important enough to warrant the existence of an insurance contract. Many policies of insurance exclude unimportant losses because the cost of insuring is greater than the value of protection given. Obviously, to cover every small loss would increase greatly the cost of protection."*[14]

Losses which are not accidental and are intentional are not uncertain. As the primary role of insurance is to eliminate future uncertainty, expanding business in a line with moral hazard problems is a financially unsound proposition.

25. If the above insurability requirements were taken as rigid guidelines for writing insurance covers, a very small amount of insurance would be sold in many lines. Often insurers anticipate that the insurability characteristics of a particular risk will improve in the near future and want to capture market share

while other insurers are hesitating. Risks with poor insurability profiles are sometimes initially written at a loss in order to establish market share in other classes of business: a financially inopportune crop or a livestock cover may be provided in order to open the door for selling more profitable fire (property and casualty) or life/health insurance products. If an insurer is state-owned, inferior risks are frequently covered for social development or political reasons. In agricultural insurance, providing a loss-making cover is sometimes seen as a better alternative to not providing any cover at all, as the costs of price and supply irregularities of agricultural products and social discontent in rural areas are perceived to be much greater than any losses that an agricultural insurance line could generate. This is, however, not an insurance problem and will not be considered for further discussion in this note. What will follow is a comparative review of several different situations in agricultural insurance, based on data and information supplied by government authorities and insurance companies, keeping in mind the cited insurability criteria and reflecting on how the examples have managed or failed to manage to become profitable.

Chapter IV
FINANCIAL IMPLICATIONS: PROBLEMS AND PRACTICE

A. Is agricultural insurance large enough to be commercially viable on its own?

26. A major characteristic of agricultural insurance is that it generates a very small part of gross premiums written in many countries. Table 1[15] presents several examples for both crop and livestock insurance. We find most figures

Table 1

Agricultural insurance as a per cent of Gross Premiums Written		
Country	Crop insurance	Livestock insurance
Algeria	1.18	0.58
Argentina	0.73	-
China	1.00	5.30
Colombia	0.01	-
Costa Rica	0.15	0.01
Cyprus	15.00	-
India	0.50	0.02
Madagascar	0.31	0.01
Mexico	0.80	0.03
Philippines	0.58	0.05
Thailand	-	0.10

are confined below the 1.00 per cent level, with a few exceptions. The total premium volume of almost all developing countries amounted to US dollars 82.? billion in 1991 and represented 5.81 per cent of the total world insurance business. Even if we demonstrate utmost optimism and estimate that crop and livestock insurance generates about 3 per cent of premiums in developing countries, the total business generated would not exceed US dollars 2.5 billion or 0.18 per cent of the total world premiums. The small volume of insurance premiums is a large obstacle to managing a financially viable agricultural insurance line.

27. Comparing the importance of agriculture in the economies of developing countries with the amount of premium volume that agricultural insurance generates as a proportion of total premiums gives us a particular insight into the financial circumstances in this sector. Figure 5 deals with the issue of the significance of agricultural insurance in developing countries with large agricultural sectors. It should be noted that, in the developed market-economy countries, agriculture represents 2.4 per cent of all economic activities in terms of GDP. In developing countries, the average figure rises to 17 per cent of GDP.[16]

28. The data presented in figure 5, although incomprehensive and inconclusive, allows us to comment on a number of commercial and financial issues. We can observe that there is no definite correspondence between the size of the agricultural economy in a country and the pervasiveness of agricultural insurance. Regression analysis gives us a linear relationship with a negative slope parameter, i.e. *agricultural insurance as a percentage of NGP* increases with the decrease in *agriculture as a percentage of GDP*. However, the coefficient of determination R^2, a measure of goodness of fit of the linear relationship to the data, is very low (0.0693). The low value of R^2 can be partially explained by the low negative correlation between *agricultural insurance as a percentage of NGP* and *agriculture as a percentage of GDP*: $r = -0.2633$. At the low end of intensity of agricultural insurance in total insurance premiums, we find a wide range of countries in terms of the relative size of their agricultural sectors. Countries with little or no insurance are typically very dependent on natural conditions, be they generous or adverse. Agricultural insurance is only one component of managed agricultural production, which also includes financial, commercial and technical facilities, management and know-how. A low level of agricultural insurance usually means a low level of the other components and therefore it is difficult to distinguish the effects of insurance in isolation.

29. What figure 5 definitely points out is that agricultural products and the assets used to produce them generate a very small proportion of insurance premiums, either because of their small value or because of insurability problems, in spite of premium rates in agricultural insurance being very high when compared to other sectors.

30. An ongoing UNCTAD survey on agricultural insurance has revealed that premium rates in this sector range between 1 and 10 per cent, sometimes reaching levels of up to 15 per cent. This is in stark contrast with the fire sector in

developing countries where rates average out to 0.025 per cent.[17] Such high rates in agricultural insurance are caused by two factors:

1. High pure rates; the loss variance of agricultural exposure units is higher than those of extractive, manufacturing and services industries, and

2. High loading for management, administration and distribution; as the values of the insured assets are small, the fixed costs of providing insurance grow disproportionately larger and force premium rates into levels not found in other sectors.

31. In the following two subsections, this note will discuss the risk conditions in agricultural insurance that are responsible for high pure premium rates and the underwriting conditions that contribute to high loading. We will try to determine if there is a relationship and trade-off between the performance of the loss ratio and the expense ratio and how this effects overall underwriting results.

B. Premium rate compatibility: loss variance, government assistance, reinsurance and direct capacity

32. Figures 6 through 11 chart time series for loss ratios in several countries. A highly variable loss ratio for crop insurance is characteristic of all six illustrated countries, while the livestock insurance sector produces significantly less variable results. However, unless livestock insurance generates premium income volumes approaching amounts produced by crop insurance, it cannot significantly reduce the overall loss variance of an agricultural insurance portfolio embracing both sectors. The fire insurance sector is plotted in order to provide a reference for the variability and size of losses in agricultural insurance.[18]

33. We can observe that in all six countries the loss ratios in the fire sector are less variable and typically at a lower level than losses in crop insurance and, with the exception of the Philippines, livestock insurance. Such risk conditions substantiate factor 1. The nature of loss in agricultural insurance is in many ways analogous to losses dealt with by catastrophe insurance in that it requires dedicated underwriting capacity and capital, higher solvency requirements and a spread of risk over time through tax-free reserving and multi-year contracts to correspond with the cycles for weather and disease. In three countries loss ratios during one particular year approached and exceeded the 200 per cent mark. If capital and reserves were large enough to support a conservative solvency margin of 200 per cent, in the event of such high losses insurers would have to completely re-capitalise their agricultural insurance operations in order to continue doing business in the next underwriting year. The high variability of losses and potentially very high peak loss ratios accentuate the need for government involvement, as well as dependable reinsurance for agricultural covers. Governments may play an important role by:[19]

- Integrating disaster relief programmes, which are typically what give Governments the *"insurer of last resort"* label, with commercial agricultural insurance schemes;

- Creating a fiscal and legislative environment congenial to agricultural insurance;

- If the insurer is state-owned, enlarging the capital base apportioned to writing agricultural risk of that insurer(s); and

- Supporting efforts targeted at establishing pooling arrangements and creating reinsurance capacity at national and regional levels.

34. When considering the inter-linkage between government relief programmes and commercial agricultural insurance, a certain disparity arises. In order to be financially viable, insurers must charge rates that are compatible with the loss variation of the portfolio, i.e. the risks underwritten. As these rates can be quite high, insurers may not be able to sell a sufficient number of policies to justify Governments using insurers as distributors of relief aid to farmers on the occurrence of a natural disaster. The implied condition is that only farmers with at least a minimum amount of cover qualify for relief assistance, while farmers with no insurance would not benefit from government relief. This system can work only if agricultural insurance is widespread. However, at present rates such covers can accommodate only a select number of farmers, with the additional disadvantage of greatly increasing moral hazard and inviting adverse risk selection problems. Most efforts aimed at increasing farmer participation, such as an open participation policy and allowing late purchase of covers (i.e. inadequate selection), insuring for higher than average yields and government restrictions on premium rate increases,[20] do not improve the loss distribution as discussed in paragraph 15. In some countries insurers seemingly manage to establish a wide distribution. However, the insurance provided very often covers a limited number of risks and deals with perils that do not usually cause catastrophic losses (e.g. it should not be complicated to underwrite profitably a wheat / hail & frost cover in comparison to a multi-peril cover).

35. Governments and policy-makers therefore have to be very clear as to the purpose of agricultural insurance. If wide participation is to be encouraged, a conclusive cost/benefit analysis should be undertaken, and if potential future losses are envisaged a source of finance should be determined. Most importantly, the insurance covers to be used as the basic vehicles for widespread participation should satisfy three elementary criteria:

1. They should underwrite a small and select number of very common risks;

2. They should provide cover against one or two named perils that, by their very nature, do not produce losses of catastrophic proportions; and

3. They should be priced correctly and should not require large amounts of subsidization or produce a large profit: if the above two criteria are respected, the rates should be well below the average for the crop or livestock sectors while providing acceptable results for insurers.

36. Agricultural premium rate compatibility with reinsurance rates in the international market is an important condition for managing a profitable agricultural insurance portfolio. Unless a country is large enough to maintain independence of even the most detrimental and catastrophic natural perils, it should not rely on its own national market to retain the full risk of its portfolio through national reinsurance capacity. International reinsurance is almost inevitable, in particular for crop risks where exposures can be quite high. Reinsurance for livestock insurance may be less in demand as it is much less susceptible to catastrophic losses. An UNCTAD survey on agricultural insurance supports this view.[21] Figure 12 gives an outline of the utilisation of reinsurance in agricultural insurance. It is important to keep in mind the number of respondents (size of the sample base): 25 countries for crop and 28 countries for livestock.

37. We may observe that more reinsurance is purchased for crop than for livestock insurance. Similarly, crop covers are reinsured more extensively in the international reinsurance market than livestock risks. The importance of international reinsurance is relatively understated in figure 12, as we should recognize that many domestic reinsurers cede an important portion of their agricultural insurance portfolio in the international market as well. Brokers are somewhat less engaged in this insurance sector, as the value of most exposure units or even the whole agricultural insurance portfolio is not large enough to be split between several intermediaries and therefore the insured, the insurer or the domestic reinsurer often deal directly with international reinsurers.

38. Apart from the catastrophic loss potential of agricultural risks that guides insurers towards international reinsurance, there are two additional benefits in doing so. First, the international insurance market usually demands extensive information about the object of insurance, the expected perils and the hazards involved. This may compel the insurer, in particular if state-owned and pursuing agricultural insurance as a matter of social policy rather than commerce, to get a better feeling for the risks it is underwriting and to improve its assessment of relief requirements in the case of a catastrophic loss. Secondly, if both insurer and reinsurer agree to a direct and reinsurance premium rate and the insurer does not make a loss on ceding, the chances of having determined an actuarially correct rate are enhanced. The problem of a lack of reinsurance availability for agricultural insurance, on closer observation, often turns out to be a problem of direct and reinsurance rate incompatibility, whereby the direct rates are not sufficient to allow a profitable or break-even result.

39. It is obvious from the presented facts and discussion that reinsurance cannot seriously augment an insurer's capacity to write more business. High rates and information requirements do not allow insurers to approach new potential clients other than the most developed and commercialised agricultural

producers. Insurers could take full advantage of the international reinsurance market only with the commercialization of agricultural production. However, insurers may use their capacity freed though cession to offer insurance products or insurance packages adapted to conditions in agricultural areas but which do not cover agricultural risks in the narrowest sense. This idea is confirmed by an UNCTAD survey on agricultural insurance.[22] Figure 13 indicates the extent to which different insurance products are offered (sample: 44 countries).

40. It is clear that many insurers have realised the limitations to offering only crop or livestock insurance products. Apart from the difficulties in increasing premium volumes by underwriting risks at the low end of the insurability scale, for which reinsurance is difficult to obtain at the going rates for better risks, the investments made in creating an insurance market in agricultural areas should be capitalised upon and a variety of insurance products should be offered. Developing a broad insurance awareness in agricultural regions will enhance future demand for specialized covers such as crop or livestock insurance. It is worth noticing that the top four non-crop/livestock covers (equipment, storage, life and accident) generally do not carry the potential for catastrophic losses, and rating the risks in these lines should not pose a problem. They are therefore welcome additions to an insurer's portfolio and should help counteract the high loss variance associated with crop insurance and on occasion with livestock insurance.

C. The insurer's predicament: maintaining a balance between losses and management expenses

41. It has been suggested that an inverse correspondence may exist between underwriting results on the one hand, and management and administrative expenses on the other.[23] The theory is that an underwriter may endeavour to study the risk of a particular line at length and observe and analyse every facet, thereby providing actuarially correct rates, minimizing adverse selection problems and estimating properly how much retention on the line the insurer's capacity allows. The claims assessor may be meticulous to the same degree and reduce any possibility for moral hazard. If the insurer also decides to purchase the services of the best agents and brokers, it is difficult to see a continuously unfavourable loss result in the future. Still, the underwriting result (or combined ratio) may be extremely unfavourable for all this good underwriting may have increased the fixed costs of insuring so much that the insurer finally produces a financial loss. Figure 14 may give some insight as to the existence of such a correspondence.[24]

42. In considering the data presented in figure 14, we may make several comments. We can observe that there is a definite correspondence between management and administrative expenses and underwriting results. Regression analysis gives us a linear relationship with a negative slope parameter (-0.95), i.e. underwriting results improve as expense ratios decrease. The coefficient of determination is high ($R^2 = 0.9435$), indicating a very good fit of the linear relationship to the data, while the correlation coefficient of $r = -0.97$ implies the existence of an almost perfect negative relationship. Although the presented data has its limitations, we may try to explain this result as a selection

problem. We may note that, in an UNCTAD survey on agricultural insurance, seven countries (out of 28 surveyed, i.e. 25 per cent) reported adverse selection being a major problem in crop insurance. This proportion is actually understated, as selection problems should, by definition, not affect a compulsory insurance scheme or schemes involving a credit condition. Such schemes were present in nine countries, and of those two reported being affected by selection problems.

43. We must again refer ourselves to the nature of the agricultural risk. It is a difficult line to insure, as the information necessary to asses the risk, as well as to determine the quantity and cause of the loss, is often of deficient quality when compared to marine or fire insurance. The exposure to catastrophe-causing natural perils adds additional complication to the underwriting process. Incurring management and administrative expenses in order to reduce loss results would increase rates immediately to cover the additional costs, while the results may only improve sometime in the future when enough information and experience has been accumulated. The increase in rates, under a voluntary regime, usually invites selection problems which cause a substantial deterioration of loss results.

44. Referring again to table 1, apart from Cyprus and Zimbabwe, where citrus plantations and cattle rearing respectively are thoroughly commercialised activities, in many other countries both crop and livestock portfolios are usually below the 1 per cent mark in terms of their participation in gross premiums. There is much less uniformity when observing the number of technical experts employed by insurers to assist with risk and claims assessment, since the number ranges from under 10 to nearly 300 for crop insurance and 1,500 for livestock according to reports made available to UNCTAD. Among the surveyed countries, Cyprus (crop), Zimbabwe (crop and livestock), the Philippines (livestock) and Mexico (crop and livestock) reported reasonable expense ratios within the 10-20 per cent range. Many surveyed countries reported ratios in excess of 50 per cent of their premium income for agricultural insurance. The loading necessary to take on such expenses would surely lead to a decline in purchase of covers and an increase in selection problems. Nevertheless, 56 per cent of surveyed countries responded that their crop insurance premium rates vary with claims experience. The figure was slightly lower at 40 per cent for livestock insurance.[35] However, many insurers appear to decide to take the loss rather than change rates or conditions drastically.

45. While improved risk and claims assessment through better technical and insurance skills are definitely needed and welcome, they have to be implemented under conditions of improved efficiency. The improvement of management with a corresponding reduction of management expenses is not easy to achieve, but it is, nevertheless, not an insurance-specific problem, although some possible solutions may lie in the nature of the business. Apart from using the same administrative infrastructure to market other non-crop/livestock covers that may be viable in agricultural regions, insurers may also pool their resources and expertise and thereby avoid duplication of administrative capacity. The Philippines Pool of Livestock Insurers is one such organization which reports very low expense ratios of between 5 per cent and 10 per cent, while at the same

time charging fair premium rates and managing an average loss ratio of 71 per cent for the 1988-1992 period.

Chapter V
CONCLUSIONS

46. While no definitive positions can be taken, we may again reflect on the mandate of the Standing Committee[26] and the discussions during its second session, as well as the deliberations of the Expert Group on Agricultural Insurance, and see whether the present note has brought us nearer to a viable policy recommendation on the role of agricultural insurance in developing countries. In examining possible conclusions, it should be kept in mind that agricultural insurance is in the founding stage in many developing countries and much work needs to be done on developing technical expertise and historic risk information.

47. Each insurer and each Government must answer this question for themselves. The costs and risks involved in agricultural insurance can impair the financial capacity of insurers in developing countries, with grave effects on policy-holders and other beneficiaries. Insurers should carefully analyse the trade-offs between the lack of competition in a new market with the costs of developing the new market. The theory is that insurers may be able to acquire additional profits due to a lack of competition and therefore excessive pricing in rural areas, but this is not a realistic assumption given the increasing presence of regulatory authorities and consumer associations and their influence on (fair) pricing policies. There is almost never an immediate net financial gain in developing a new insurance market, and most calculations should be made based on earnings expectations over a long period which need to be kept very realistic, if not on the pessimistic side.

48. In considering directions for commercial expansion in rural areas, insurers should assess the potential for all types of covers. A livestock insurance line may be established by an insurer for his own account but with great caution and thorough preparation. Apart from covers addressing specific agricultural risks, insurers may find that products previously offered only in the urban environment, and which are now adapted for marketing in agricultural regions, are good business. In general, as far as multi-peril crop insurance and insurance lines that have problems related to risk independence, exposure or tariffs are concerned, care should be taken before entering into such business. The introduction of crop insurance should preferably be done through a government-supported framework with the cooperation of the international reinsurance market. Ideally, crop insurance covers should be constructed on a one-crop and one-non-catastrophic-peril basis. Multi-peril and multi-crop policies do not have a history of good results[27] and may be affected by high levels of loss event correlation. They should not be offered by insurers without previously conducting a most profound and critical analysis of all the involved risks, perils and hazard conditions.

49. If an insurer is already writing crop insurance, expanding business and increasing premium volume in this line may not be a good growth strategy at

the present, unless there are special conditions to indicate otherwise. The insurer should first compare possible alternatives, such as re-engineering the crop insurance book in order to reduce retention and exposure, and free capital and reserves to provide capacity for writing rural insurance lines with less catastrophe potential. An insurer may continue to write crop covers for a limited number of non-catastrophic perils provided sufficient historical information is available on hazard and risk conditions.

50. While agricultural insurance has an important role in supporting the development of modern agriculture, its introduction and proliferation must not be left to the courage of individual insurers. If Governments wish to see agricultural insurance as a standard component of modern agriculture, then they have to provide financial means substantial enough to make available excess reinsurance covers to the direct insurers. They may do this through capitalizing a reinsurer, acting as a substantive participant in a reinsurance pool or providing subsidies to make up for the gap between direct rates and international reinsurance rates.

FIGURES

Figure 1

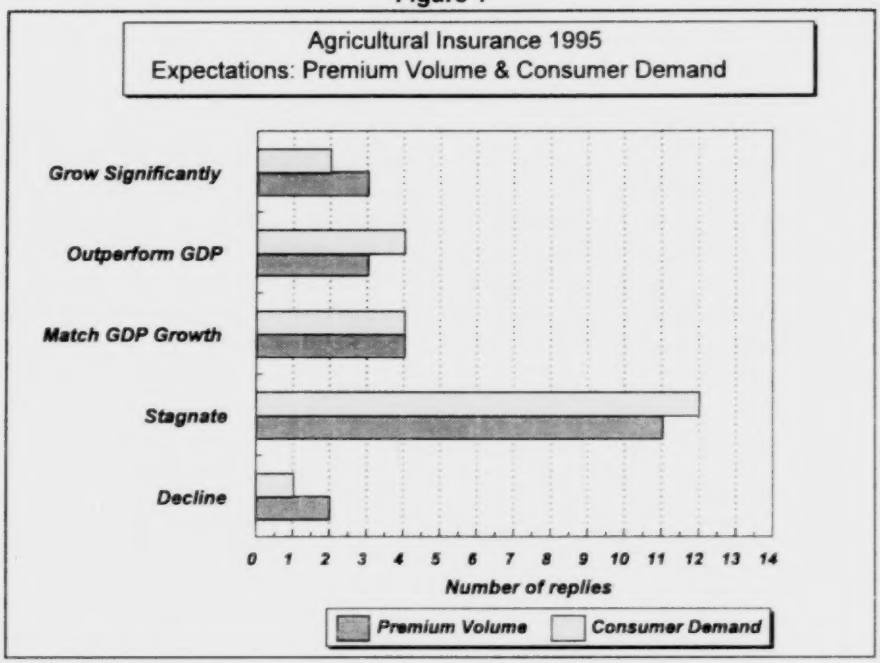


Figure 2

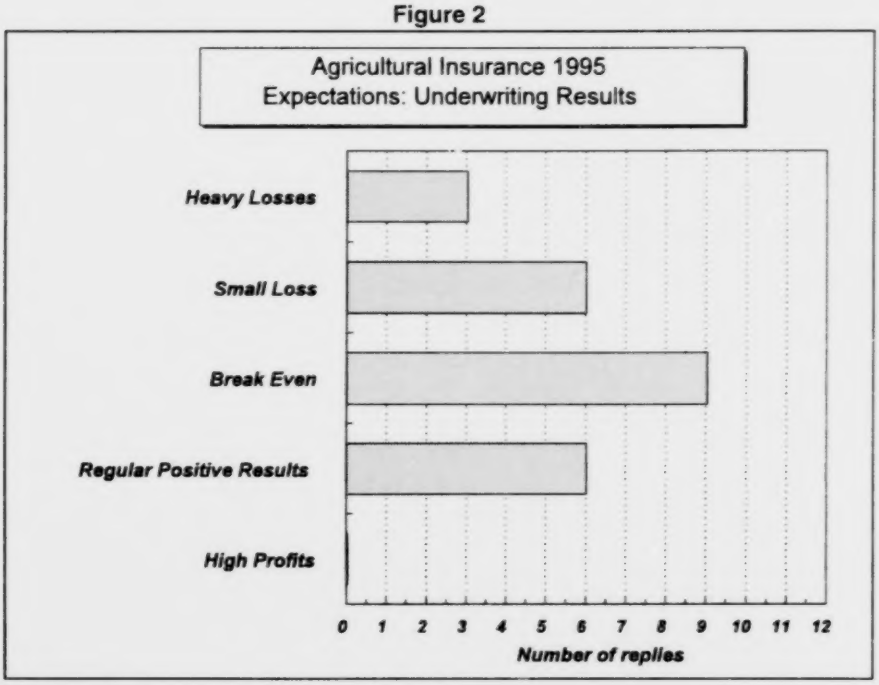


Figure 3

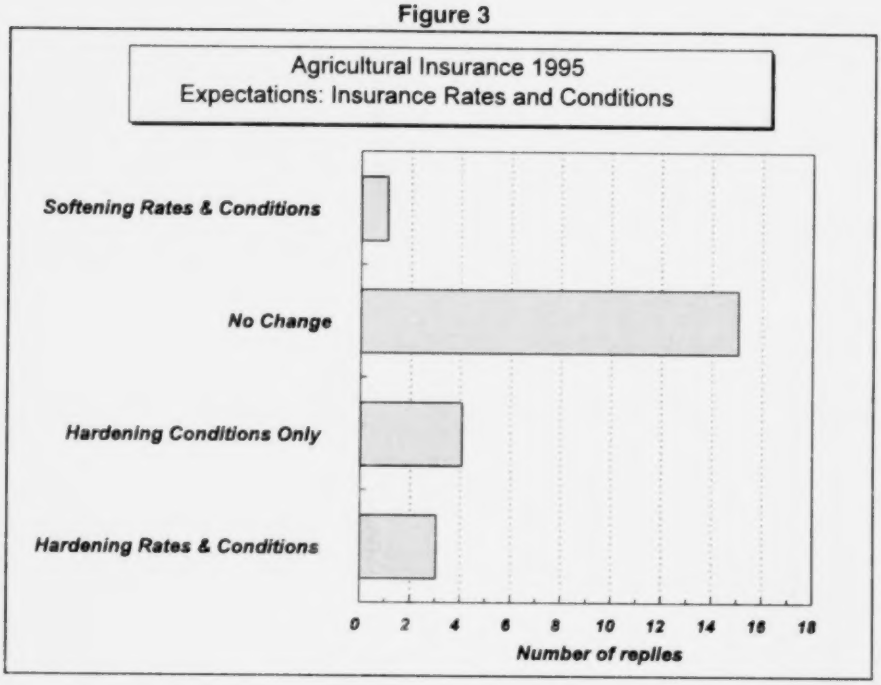


Figure 4

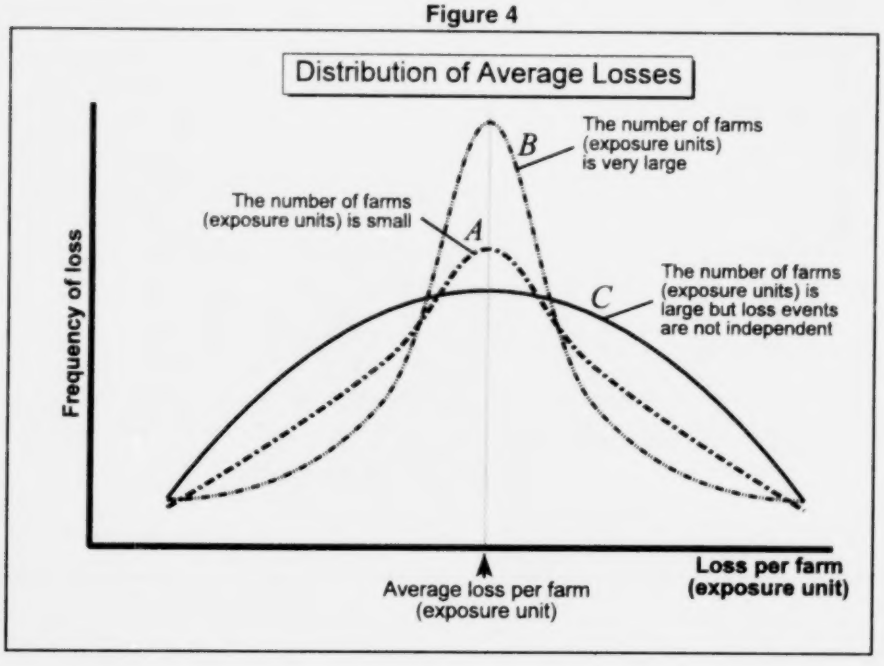
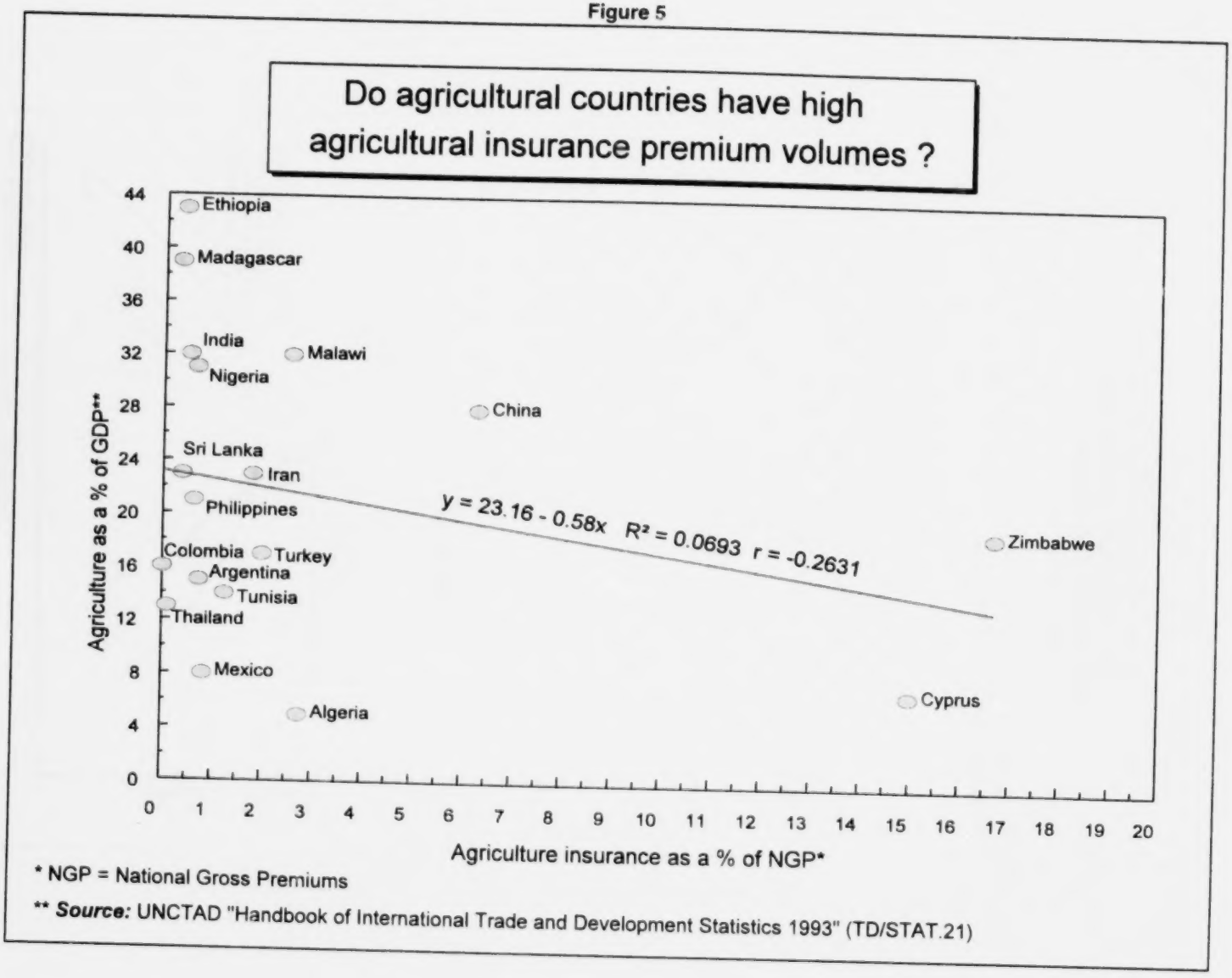

Distribution of Average Losses
The number of farms (exposure units) is very large
B
The number of farms (exposure units) is small
A
C
The number of farms (exposure units) is large but loss events are not independent
Frequency of loss
Average loss per farm (exposure unit)
Loss per farm (exposure unit)

Figure 5



* NGP = National Gross Premiums

** ***Source:*** UNCTAD "Handbook of International Trade and Development Statistics 1993" (TD/STAT.21)

Figure 6

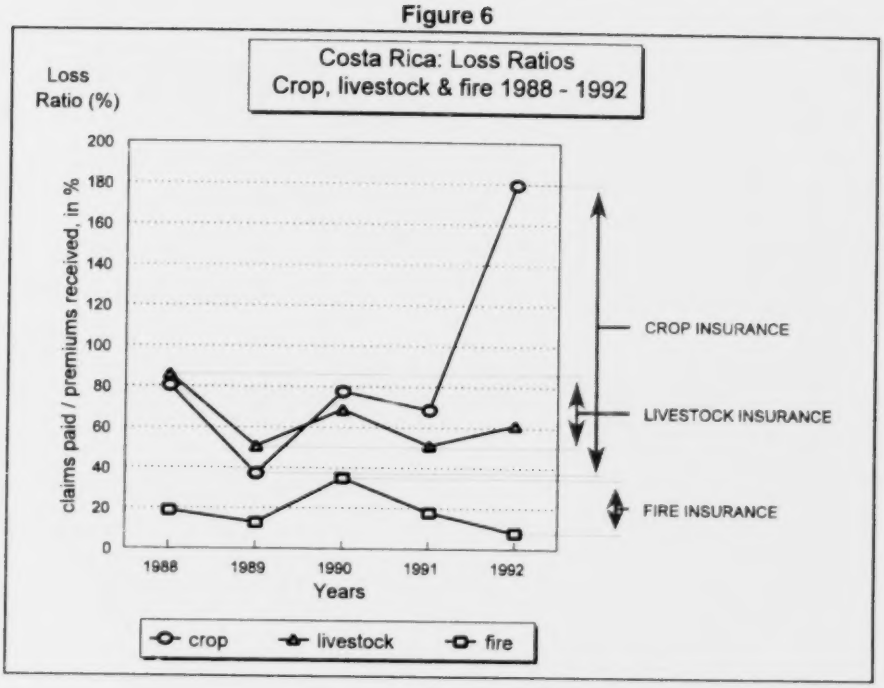


Figure 7

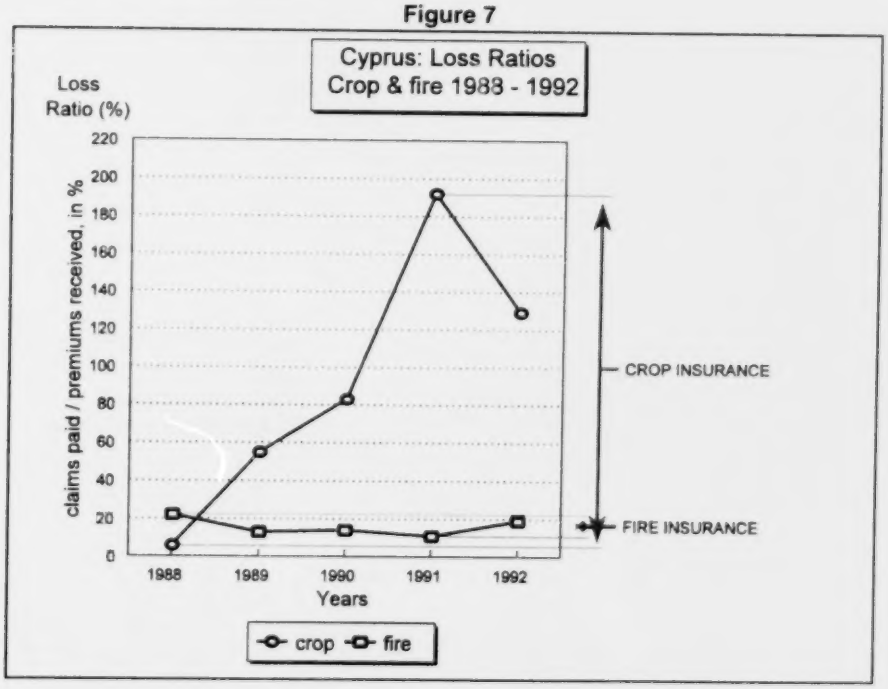


Figure 8

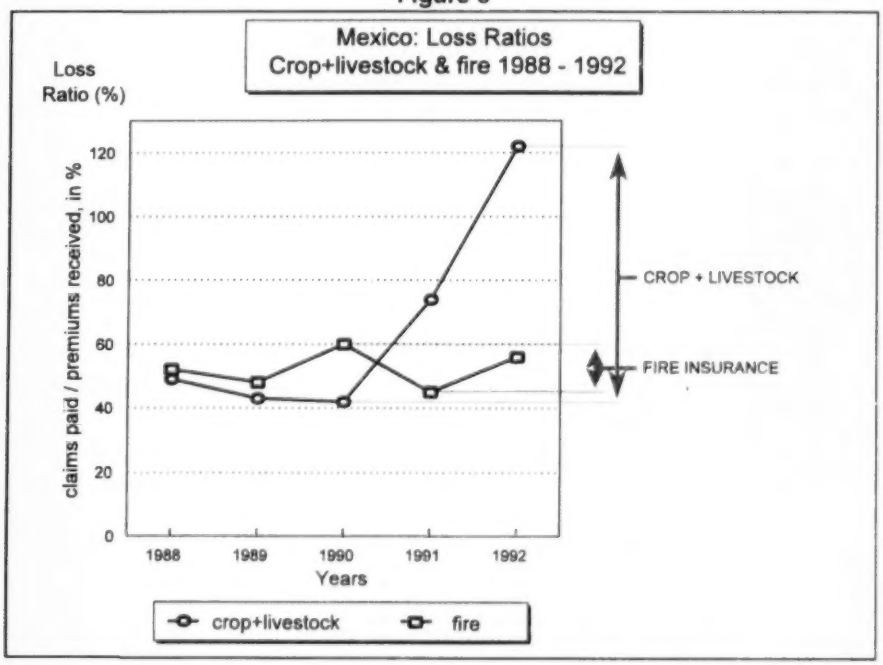


Figure 9

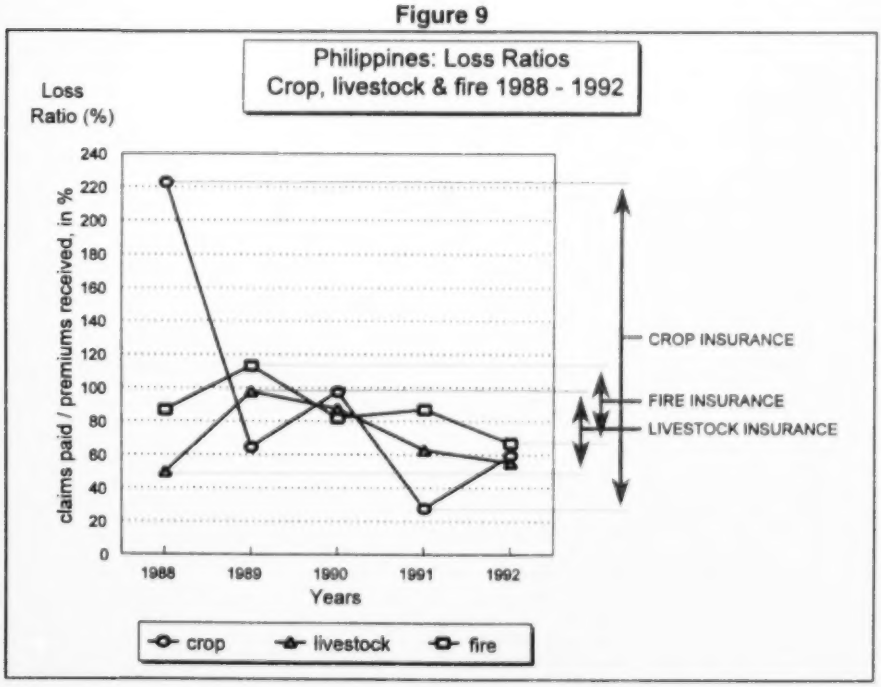


Figure 10

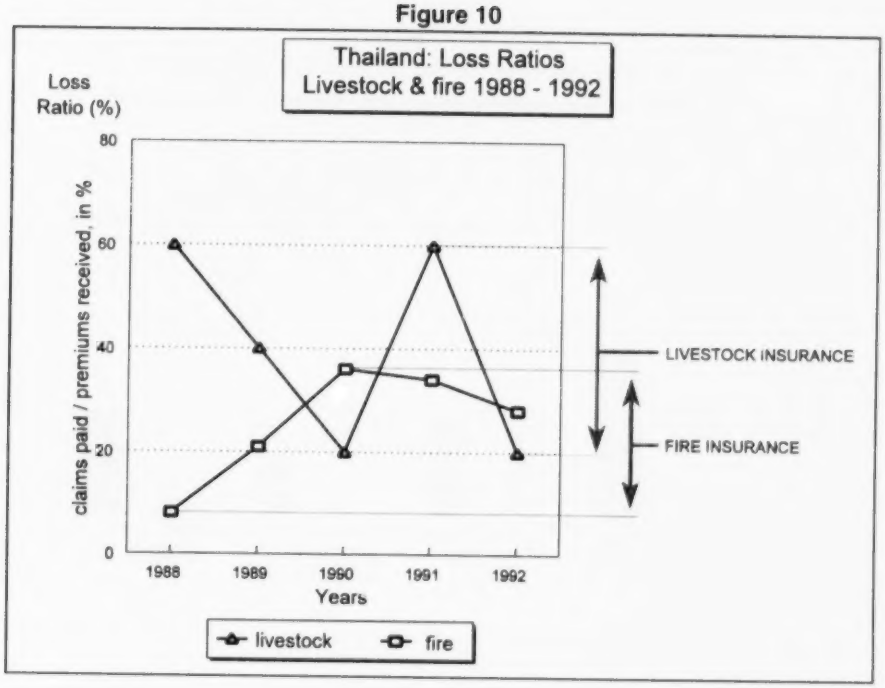


Figure 11

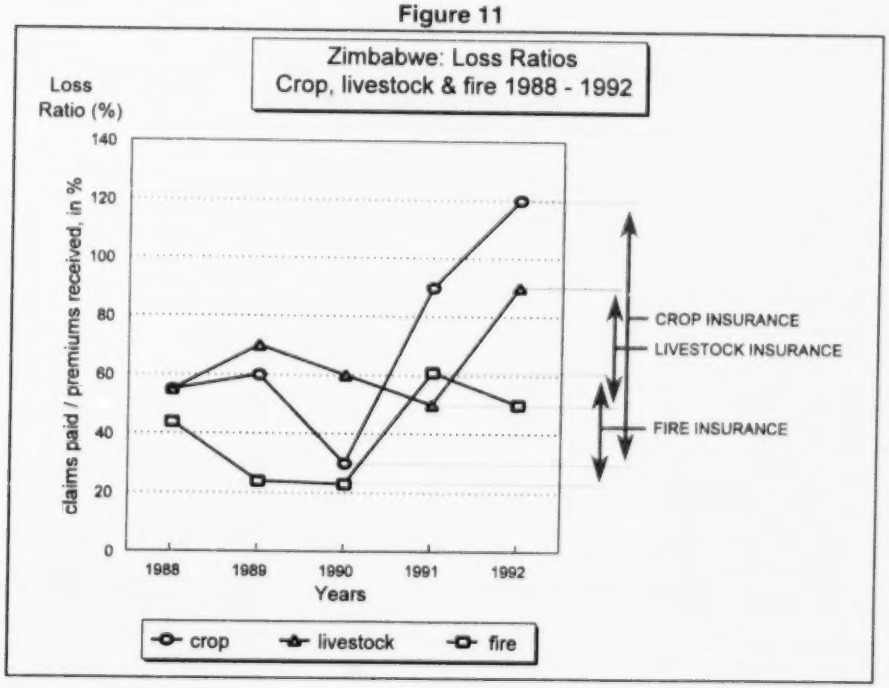


Figure 12

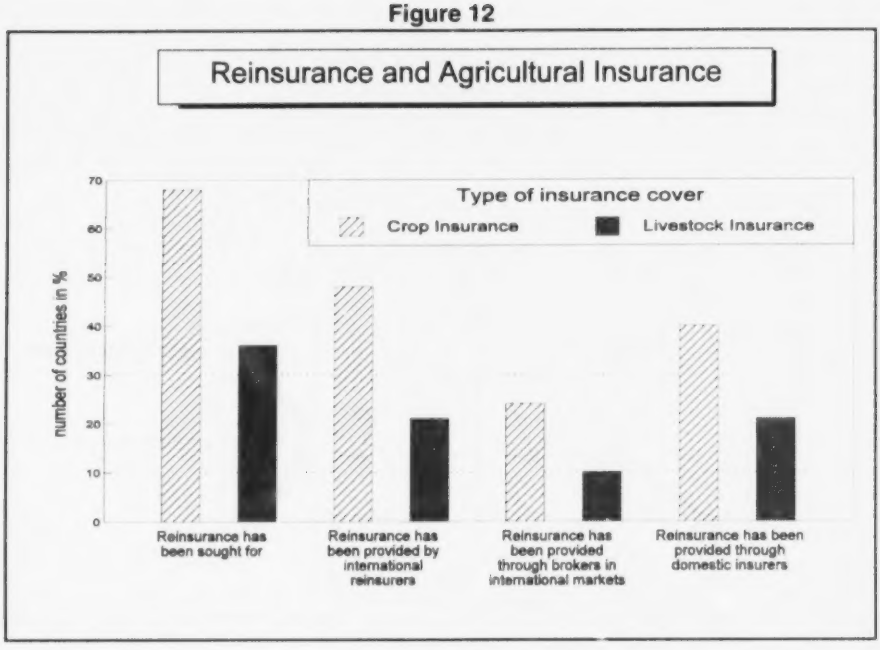


Figure 13

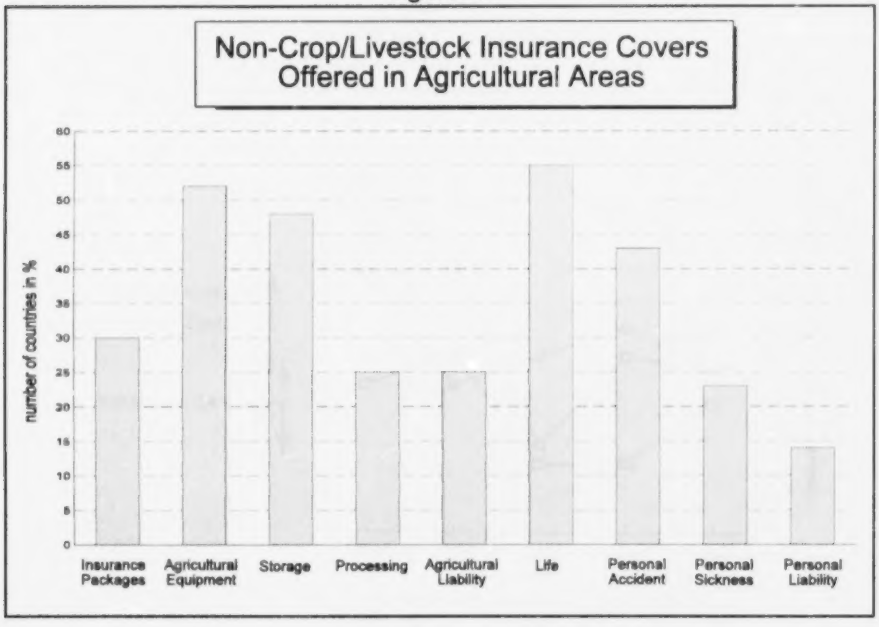
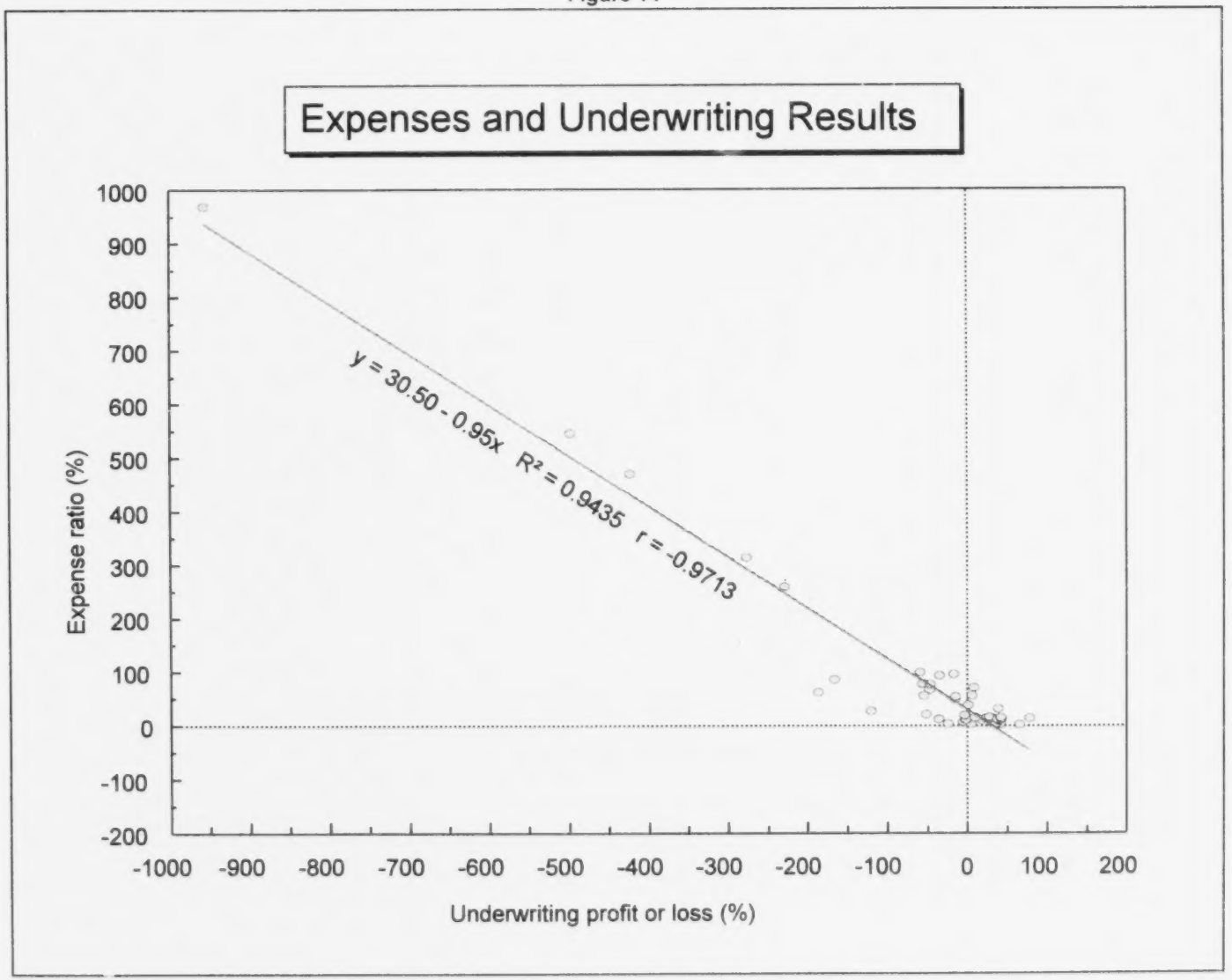


Figure 14


Expenses and Underwriting Results
Expense ratio (%)
1000
900
800
700
600
500
400
300
200
100
0
-100
-200
y = 30.50 - 0.95x R² = 0.9435 r = -0.9713
-1000 -900 -800 -700 -600 -500 -400 -300 -200 -100 0 100 200
Underwriting profit or loss (%)

NOTES

1. UNCTAD, "Report of the Standing Committee on Developing Services Sectors: Fostering Competitive Services Sectors in Developing Countries - Insurance on its second session" (TD/B/41(1)/8 and TD/B/CN.4/38), 9 August 1994, p. 15, para. 10.(a).

2. UNCTAD, "Issues of agricultural insurance in developing countries" (TD/B/CN.4/30), and UNCTAD, "Agricultural insurance in developing countries" (UNCTAD/SDD/INS/1/Rev.1).

3. In particular, reference should be made to UNCTAD, "Agricultural insurance in developing countries" (UNCTAD/SDD/INS/Rev.1). This study provides a detailed discussion of underwriting and claims assessment problems and techniques and information on the state of agricultural insurance in 44 developing countries.

4. Replies were received from insurers from the following countries: Algeria, Argentina, Bahrain, Brazil, Cameroon, Chile, Colombia, Ecuador, Egypt, Ghana, India, Indonesia, Kenya, Libyan Arab Jamahiriya, Malaysia, Mauritius, Mexico, Morocco, Nigeria, Pakistan, Peru, Republic of Korea, Senegal, Singapore, Sudan, Thailand, Zambia and Zimbabwe.

5. UNCTAD, "Issues of agricultural insurance in developing countries" (TD/B/CN.4/30), paragraphs 81 and 84.

6. See paragraph 3 above.

7. UNCTAD, "Issues of agricultural insurance in developing countries" (TD/B/CN.4/30), paras 81 and 84.

8. UNCTAD, "Agricultural insurance in developing countries" (UNCTAD/SDD/INS/1/Rev.1), para. 414.

9. A full list of recent insurance studies can be found in UNCTAD documents "Provisional agenda and annotations to the provisional agenda" (TD/B/CN.4/29) and "Provisional agenda and annotations to the provisional agenda" (TD/B/CN.4/51).

10. See note 4 for the list of countries.

11. George E. Rejda, Principles of Insurance, 3 ed., Scott, Foreman and Company, Glenview, Illinois, 1989, pp. 21-23.

12. "Crop Insurance - Federal Program Faces Insurability and Design Problems", GAO/RCED-93-98, Report to the Chairman, Committee on Agriculture, Nutrition, and Forestry, US Senate, p. 3.

13. UNCTAD, "Review of developments in the insurance market - Alternatives for insurance of catastrophes, environmental impairments and large risks in developing countries" (TD/B/CN.4/32), 1 June 1994, para. 66.

14. Robert Riegel, Insurance Principles and Practices - Property and Liability, 6 ed., Prentice Hall, London, 1976, p. 16.

15. The figures are rough estimates and are indicative of the approximate size of the agricultural insurance sector. They are based on information provided to the UNCTAD secretariat and relate to the period 1988/89 through 1990/91. Premiums written in agricultural insurance in absolute value and as a proportion of total national premium income vary from year to year to such an extent to make most cross-country comparisons for a particular year meaningless.

16. UNCTAD, Handbook of International Trade and Development Statistics 1993 (TD/STAT.21), Sales No. E/F.94.II.D.24, September 1994, tables 6.3 and 6.4. The cited data and data used in figure 5 relate to 1991.

17. The figure is only an approximation and is based on statistics received for an upcoming edition of the UNCTAD "Statistical Survey of Insurance and Reinsurance Operations in Developing Countries" while the methodology is explained in "A ten country analysis of catastrophe exposure, insurance sector and country financial capacity to bear risk" (UNCTAD/SDD/INS/8).

18. The non-life sector is not plotted, as it represents a portfolio with an innate reduced loss variance compared to its component sectors (fire, motor, transport, etc.).

19. These suggestions are based, in part, on the UNCTAD "Report of the group of experts on agricultural insurance in developing countries" (UNCTAD/SDD/INS/4), 2 February 1993, items 8 and 9.

20. "Crop Insurance - Federal Program Faces Insurability and Design Problems", p. 5.

21. UNCTAD, "Agricultural insurance in developing countries", chapter X.

22. UNCTAD, "Agricultural insurance in developing countries", chapter X.

23. "Crop Insurance - Federal Programme Faces Insurability and Design Problems", pp. 4 and 40.

24. Figure 14 covers the same countries as figures 6 through 11 with each marker coordinated by country data for a particular year.

25. UNCTAD, "Agricultural insurance in developing countries", chapter X.

26. UNCTAD, "Report of the Standing Committee on Developing Services Sectors: Fostering Competitive Services Sectors in Developing Countries - Insurance on its second session" (TD/B/41(1)/8 and TD/B/CN.4/38), 9 August 1994, p. 15, para. 10(a).

27. FAO, "Strategies for crop insurance planning", FAO Agricultural Services Bulletin No. 86, Rome, 1991.